Trade openness and working poverty: empirical evidences from developing countries

Hazera-Tun- Nessa

*Department of International Business, Faculty of Business Studies,
University of Dhaka, Dhaka, Bangladesh, and*

Katsushi S. Imai

Department of Economics, The University of Manchester, Manchester, UK

Abstract

Purpose – Existence of working poverty reduces the effectiveness of the strategy of "increasing employment to reduce poverty". Developed countries are already concerned about it but insufficient attention has been made by developing countries. Focusing on developing countries this study identifies (1) the effects of trade openness (TO) on working poverty and (2) whether the working poverty trap exists or not in developing countries. Both objectives are also analyzed for three subsamples of low income, lower-middle income and upper-middle income developing countries.

Design/methodology/approach – Panel data for 98 developing countries over the period of 2000–2016 have been collected for the study. Fixed effect and GMM methods are applied for static and dynamic analysis, respectively.

Findings – The study finds that TO significantly reduces working poverty rate (WPR) (mainly driven up by upper-middle income developing countries). The positive association between WPR with its previous year's rate proves the existence of working poverty trap.

Research limitations/implications – The study's outcome is subject to selected time, countries and methods. Future research should use more improve methods and should identify the channels through which TO could affect working poverty.

Practical implications – Middle income and upper-middle income developing countries should increase TO to reduce the working poverty. Low income developing countries that have the highest working poverty should search the way to derive beneficial effects of trade on working poverty.

Social implications – Working poverty is not only a developed country issue rather it is a global phenomenon. Hence, it is expected that the study will raise the social consciousness about this phenomenon in developing countries too.

Originality/value – The study fulfills the gaps of identifying the effects of TO on working poverty and existence of in-work poverty trap in developing countries.

Keywords Trade openness, Working poverty, Developing countries, Panel data, Generalized methods of moments (GMM)

Paper type Research paper

1. Introduction

> With free trade and open markets, globalization was expected to better equalize rich and poor countries and empower consumers with more affordable options. Globalization has, in fact, managed to fail more people than it serves. (Joseph Stiglitz, a Nobel Laureate and economist)

JEL Classification — C01, C23, F16, F19

Employment is considered as a fundamental strategy to fight against poverty for long time. But this view is confronted with the prevalence of working poor (Cantillon, 2011; Vandenbroucke and Vleminckx, 2011) which is a major socio-economic challenge (Herman, 2013). Working poverty captures the poverty–employment nexus (Kapsos, 2005) since it is defined as the percentage of employed people living under poverty line. This shows a combination of work and poverty together. To reduce poverty and to achieve equitable, inclusive and sustainable development work is not enough. Rather we need decent work and working poverty rate is one of the monitoring indicators of decent work.

Global working poverty rate is 10% and in least developed countries it is 38% (ILO, 2016). During the Great Depression, the working poverty was first considered in the United States which was reconsidered during 1960s (Harrington, 1962). With the rising poverty in the US and UK, this becomes a major concerning issue since the early 1980s. The European Union (EU) countries are concerned since 1990s (Kalugina, 2012). Working poverty rate (WPR) has also increased in EU (Eurostat Database, 2014).

Recently, working poverty issue has attained much attention in developing countries due to the sustainable development goal (SDG) of eradicating poverty in all aspects. The recent working poverty scenarios are represented in Table 1.

Although a declining trend of working poverty in developing countries has been observed in Table 1, the WPR is still high. Low income countries are suffering from high level of WPR. The decline in aggregate working poverty over the time is mainly driven by the decline in working poverty in middle income countries. Several individual, household and firm characteristics (micro factors) as well as institutional and macroeconomic shocks including globalization, deindustrialization, etc. is influencing the rate of working poverty.

Unlike traditional poverty, working poverty is closely related to globalization where the status of the poor is affected by the uncertainty and instability trends of work (Liu, 2022). With increased globalization, a country's trade openness (TO) could affect its working poverty through various channels. Previous studies overwhelmingly focused on the nexus of TO, poverty and inequality. But studies on TO and working poverty are very few and most studies in this area focused on developed country. The theoretical background analysis of Heckshier–Ohlin (HO) model, North-South Heckshier–Ohlin–Samuelson (NS-HOS) model as well Wood (1997) predicted that the effect of TO depends on trade pattern, effects on skilled and unskilled labor, etc. The effects of TO on working poor in advance countries depends on the trade pattern, North–North trade does not affect working poor in EU but North–South

	Extreme working poverty (<$1.90PPP)				Extreme and moderate working poverty (<$3.10 PPP)			
	1991	2005	2012	2015	1991	2005	2012	2015
Major Country Grouping								
Total emerging and developing country	48.6	22.2	13.7	12	67.3	44.7	31.2	27.9
Middle-income countries	51.1	20.6	11.8	9.9	71.3	44.3	28.8	25.0
Low-income countries	67.2	55.1	41.5	37.5	83.6	81.7	73.2	69.8
ILO Regions (excluding Developed Countries)								
Africa	48.8	40.0	32.8	29.8	69.0	65.6	59.8	57.8
Arab States	7.8	5.0	4.1	4.6	31.1	22.2	19.4	22.0
Asia and the Pacific	59.4	23.2	12.7	10.4	80.1	48.8	31.2	26.4
Europe and Central Asia	2.8	3.6	1.9	1.5	8.8	9.0	5.5	4.7
Latin America and the Caribbean	9.1	6.6	3.7	3.5	20.5	14.6	8.6	8.2

Source(s): World Employment and Social Outlook 2016, ILO. (October 2015 update of the model in Kapsos and Bourmpoula (2013)

Table 1.
Working poverty rates (percentages) in developing and emerging countries

trade increases working poverty in EU (Hellier and Kalugina, 2015). Contrast to developed countries, the studies for developing countries are very few. While trying to find the effects of access to financial services on working poor, Coulibaly and Yogo (2016) used trade share (TS) as one of the regressors and found that increases in trade share increased working poverty in 63 developing countries. However, other developing countries should be also included and measurement of TO should be carefully chosen since the use of TS is often criticized.

Therefore, this study contributes in the existing literature by investigating the effects of TO on working poverty in developing countries with a new measure of TO, namely, composite trade share (CTS) and by identifying whether the developing countries are suffering from the existence of working poverty trap or not. The study also analyzes the effects of trade on working poverty among three country group within developing countries, namely, low income, lower-middle income and upper-middle income developing countries.

The rest of the paper is organized as follows. Related literature is reviewed in section 2. Following this, objectives and hypotheses are represented at the end of section 2. After that, methodology, findings and analysis of findings are represented in section 3 and section 4, respectively. Finally, concluding remarks are provided in section 5.

2. Literature review

If income inequality is positively related with TO and increases the poverty, then TO must influence the working poverty. However, the direction of relationship is not unambiguously positive as (1) trade may affect working poverty through other channels, (2) the effects of trade on inequality and poverty in the previous literature are ambiguous and (3) the relative weight of several determinants of in-work poverty could also influences the TO and working poverty relationship. This study will utilize the mechanism and literature on the effect of trade on poverty and inequality and literature on the determinants of working poverty.

2.1 Conceptualization of working poverty

Working poverty plays the role of intersecting "work" and "poverty" together. In a word "working poor" are those people who work but still fall below a given poverty line. There are wide varieties of definitions, measurements and approaches of working poor (Peña-Casas and Latta, 2004; Crettaz and Bonoli, 2011) across countries which are summarized by Crettaz (2013). The "working poverty rate" has been further conceptualized and estimated by International Labor Organization (ILO) – the people who are working but could not earn sufficient to make a way out of poverty.

A combination of individual, household, institutional and economic factors could explain the prevalence of in-work poverty. The "unified theory" (Blau and Kahn, 2002) of labor economics applied in explaining working poverty stated that the interaction between macroeconomic shocks (such as globalization, technological change and deindustrialization) and institutional contexts plays important role in effecting wage gaps. Similarly, by applying "welfare theory," it is observed that welfare state could reduce working poverty (Crettaz, 2011).

Also, household contexts can be an important factor for working poverty (Strengmann-Kuhn, 2003). Based on the model developed by Crettaz and Bonoli (2011) the working poverty mechanisms are redefined by Crettaz (2011) as shown in Figure 1. This figure tries to map the different factors that may have an impact on working poverty. The issue is quite complex as many factors interplay, making it difficult to disentangle exogenous from endogenous variables. Both labor market and welfare state institutions comprehensively defined here as covering both cash transfers and the provision of services play crucial roles in shaping working poverty. Low individual earnings at the worker's (individual) level, combination of
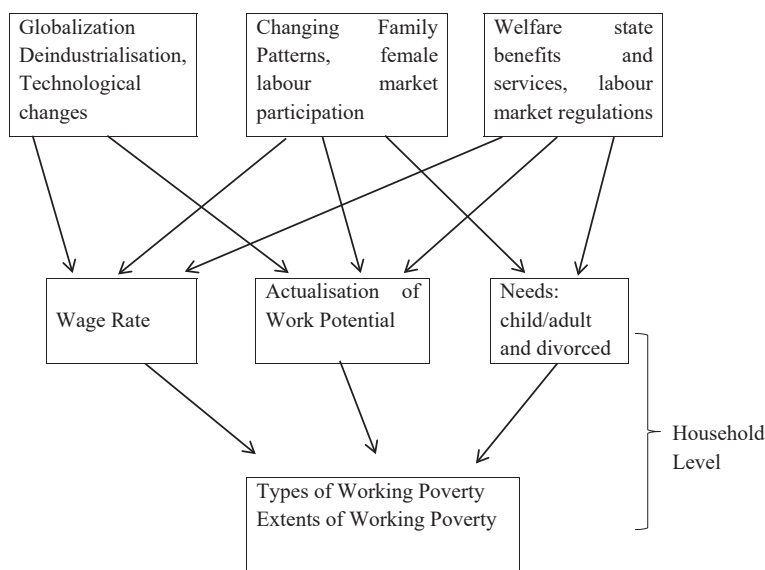
Source(s): Crettaz (2011), Figure-8.1, page 193.

factors at household level and macroeconomic shocks are shaping the pattern and extents working poverty.

2.2 Concept and measurement of trade openness
Although widely used, there is no unique definition and measurement procedure of TO and various studies have used alternatives measures of it. The most frequently used measurement of TO is export as percentage of GDP or growth of export (Balassa, 1978; Tyler, 1981; Balassa, 1985; and others). But since a country could export more while restricting imports, use of import or import growth is often advocated as higher import could reduce costs of production (Markusen, 1995). TS, which is defined (total export and import of goods and services) as percentage of GDP is the most popular measures. Criticizing the TS measure as it could mislead the degree of openness of some large trading nations, Squalli and Wilson (2011) have developed world trade share (WTS) and CTS as new measurement of TO. WTS is defined as a country's total TS relative to total world trade. But WTS could not exploit the two-dimensional nature of openness which raises the importance of using CTS by mixing TS and WTS together. The formula for calculating CTS (Squalli and Wilson, 2011) is represented in equation (1).

$$CTS_i = \frac{(X+M)_i}{\frac{1}{n}\sum_{j=1}^{n}(X+M)_j}\frac{(X+M)_i}{GDP_i} \tag{1}$$

Where, j denotes all countries in the sample and i is the country belonging to country group j and n is total number of countries. X stands for export, M stands for Import and GDP stands for Gross Domestic Products. The higher the CTS score of a country, the more its TO is relative to other countries.

2.3 Trade openness and working poverty: theoretical and empirical evidences
As the theoretical and empirical works on effect of TO on working poverty is limited, this study will utilize the mechanisms through which trade affects inequality as the latter directly increases working poverty by reducing the earnings of bottom income group.

2.3.1 Theoretical evidences. Although the classical trade economists, Smith (1776 and 1965) and Ricardo (1817 and 1951) have demonstrated the benefits of free trade and the cost of trade restrictions, the Heckscher–Ohlin (1991) model provides the main theoretical foundation for the analysis of effects of trade on labor market. The H-O theory predicts that free trade raises demand for goods produced by using abundant factors of the country which raises real return to that factor compared to other factors as described by Stolper–Samuelson theorem which is valid under H-O assumption of identical technology across countries. Therefore, the real wages would fall (increase) in developed country (developing country) due to increasing trade between them as well as skilled-unskilled wage gap could also reduce in developing countries (Sen, 2008). According to Deardorff (1986), Falvey *et al.* (1997) and others, these results could be weaken by several factors such as presence of nontraded goods, mobilization of capital to abroad, using many goods and factors, heterogenous nature of goods, different choices of consumers and specializing goods (Tyers and Yang, 1997). Extending the Heckscher–Ohlin–Samuelson model to incorporate North–South TO, the traditional NS-HOS model implied that North–South TO leads to an increase in the skill premium in North (skill-abundant) and a decrease in the South (unskilled-abundant) that is a rise in inequality in the North and a reduction of inequality in the South (Hellier, 2012). Due to restrictive assumptions of fixed endowments, factor price equalization, perfect competition, identical technologies and inability to account for international outsourcing these models could explain the real scenarios a little.

Alternatively, a model developed by Robinson and Thierfelder (1996) depicts that the pattern and extent to which factor prices are influenced by world price depends on the elasticity of substitution in consumption. The study predicted a fall of wages of unskilled labor when goods which are not traded but labor-intensive could be substituted for traded goods which require skill intensiveness. Also, Wood (1997) argued that availability of higher technology in developing countries through increased openness may increase demand for skilled workers and reduces demand for unskilled people increasing unequal distribution of wage between them.

2.3.2 Empirical evidences. Empirical studies overwhelmingly focused on trade effects on poverty and inequality. In a panel data model framework, Dollar and Kraay (2001) found very little impact of openness in reducing poverty once the growth effect has been kept constant. Later, Dollar and Kraay (2004) found that trade related growth can lead to higher wages and less poverty. Using Ccomputable Ggeneral Eequilibrium (CGE) model for Indonesia, Friedman (2001) found that trade liberalization increases the income of poor, but the findings is are found to be negative for rural poor. Using the generalized methods of moments (GMM) for a sample of 30 African countries over a period of 1981–2010, Le Goff and Singh (2014) have analyzed the impact of TO on poverty and how TO could reduce poverty. These authors used interactive variables of openness with country characteristics and found that when financial sectors are developed, law and governance are strong and education among people is higher, then the TO could reduce the poverty. A complete study dealing the issue of working poverty in the work of Hellier and Kalugina (2015), who analyzed the effect of globalization on working poor in advanced European countries by using TO as an indicator of globalization. Focusing on both macro and micro dimensions, this study identified the distinguishable effects of North–South and North–North trade on working poverty. The study applied fixed effect estimation and multilevel model to incorporate macro and micro dimensions, respectively. The findings of the study are that total TO (without divided into North–South

and North–North trade) and North–South TO significantly increases working poverty. These findings imply that competition from emerging/developing countries hurts unskilled workers in EU. The North–North trade is found to be insignificantly affecting working poverty putting emphasize on trading partners and trade with South is large enough making the TO to increase the working poverty in EU by hurting their unskilled labor. So, the concluding remarks of the study that in advance countries globalization increases working poor. For developing countries, the TO and working poverty nexus is still scarce. A little evidence could be found in the study by Coulibaly and Yogo (2016). While examining the effects of access to financial services on working poor in 63 developing countries, this study used TS (total export and import) as one of the control variables and found that TO significantly increases working poverty, confirming that demand for unskilled labor is becoming low compared to skilled labor due to TO.

So, the attempt to study the effect of TO on working poverty in 98 developing countries with logical measurement of openness is surely a contribution to the literature.

2.4 Working poverty trap
Just like the poverty trap, there might be working poverty trap. Snower (1994) analyzed how a country could fall in a low skill, bad job trap. The study argued that bad jobs are mostly associated with low wages and provide little opportunity to acquire skill and create working poor. Also, firms with smaller portion of skilled workers have little incentive to provide good jobs/training which reduces workers' incentive to acquire skill and creates a vicious cycle of working poor. Empirically, Palacios et al. (2009) showed the evidence of persistence increase in working poor in OECD area where working poverty increased more after the 1990s as well as low pay traps also exists there. Also, upward mobility incentive of low paid workers decreases with low wage and this low pay traps are higher among prime age workers than young age workers. What is happening in developing nations is still needed to be explored.

Previous literature reveal mixed results about the impact of TO on working poverty with majority showed that trade boost up inequality and hence working poverty, while the opposite affects could also be observed. The effect of trade depends on the trade pattern and on how its effects the skilled and unskilled workers. If it induces demand for skilled labor, the working poverty could increase and vice versa (Coulibaly and Yogo, 2016). The poverty trap literature overwhelmingly ensures the existence of poverty trap and evidence also shows that bad jobs further create bad-job traps.

Therefore, the first objective is to find out the impact of TO on working poverty in developing countries with a particular focus on measurement issues. The second objective is to identify whether working poverty has dynamic self-reinforcing effect (existence of working poverty trap) on itself or not. Both of these objectives will also be analyzed for three country groups, namely, low income, lower-middle income and upper-middle income developing countries.

3. Methodology of the study
3.1 Sample size and data sources
The study is based on data collected for 98 developing countries from 2000 to 2016. The number of developing countries is chosen based on data availability (see appendix Table A1 for list of sample countries). The data on working poverty are collected from the key indicators of labor market (9th Edition) made available by the ILO and TO is calculated by using the data on exports and imports of goods and services collected from World Development Indicators of World Development Bank. The whole sample has been further

divided into four groups according to the classification of World Bank during 2017–2018. Based on Gross National Income per capita (US dollar), the World Bank Classified four income groups, namely, low-income group, lower-middle income, upper-middle income and high-income countries. Table 2 summarizes basic information of country groups based on income.

Since the number of high-income countries are very few to make fixed effect or dynamic regression analysis, this study will only focus on first three groups.

3.2 Variable descriptions

3.2.1 Working poverty rate (WPR). The dependent variable, WPR is described by ILO (2016) as percentage of employed people (aged 15+) living below of \$1.90 per day (the international poverty line). The WPR for countries of all income categories has been calculated by the ILO in equation (2).

$$WPR = \frac{\text{Total employed person living in the household with income level below poverty line}}{\text{Total number of employed people}} \times 100 \qquad (2)$$

3.2.2 Trade openness (TO) measurement. This study will use two measures of TO to compare the constructed country ranking in terms of openness based on these and the better one will be chosen as openness measurement. The TS which is defined as total trade as percentage of GDP, and another one is the CTS as already described in section 2.2. But WTS could not exploit the two-dimensional nature of openness. Since CTS combines the TS and WTS together, the use of CTS is a better measurement of TO.

3.2.3 Other control variables. Based on literature, some variables will be controlled to get the impact of openness on working poverty as well as for identifying the dynamic nature of the analysis. The controlled variables are GDP growth, age dependency ratio, school enrollment, inflation, unemployment and labor productivity (see appendix Table A2 for detail definition of these variables and data sources). The trickle-down effect of growth is expected to reduce the working poor. Age dependency ratio creates pressure on family income hence expected to increase the working poor people. School enrollment is used to capture the effect of human development which is expected to reduce the WPR. Inflation as captured by consumer price index might increase the working poor through consumption effect by reducing real income and hence purchasing power. Even though working poverty falls that does not ensure better situation unless the unemployment rates are controlled since a portion of working poor might entered unemployment which is a reduction of working poor. So, the relationship between unemployment and working poverty is ambiguous.

Income group	Threshold level of GNI/Capita (current US\$))	Number of countries
Low Income Countries	<1,006	24
Lower-Middle Income Countries	1,006–3,955	39
Upper-Middle Income Countries	3,956–12,235	32
High-Income Countries	>12,235	3

Source(s): World Bank's website (https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2017-2018)

3.3 Econometric model and methods

3.3.1 Static panel model specification. WPR could be expressed as a function of trade openness (TOit) and a set of controlled variables (Xit) as shown in equation (3).

$$WPR_{it} = f(TO_{it}, X_{it}) \tag{3}$$

This study will follow the methodology of macro estimation part of working poverty–globalization model of Hellier and Kalugina (2015), working poverty-access to financial services by Coulibali and Yogo (2016) and poverty–TO by Le Goff and Singh (2014). Hellier and Kalugina (2015) utilized the literature on the relationship between income inequality and globalization and Le Goff and Sing (2014) followed the basic growth–poverty model suggested by Ravallion and Chen (1997) as well as framework suggested by Dollar and Kraay (2001), Krueger and Berg (2003). The following empirical model shown by equation (4), will be estimated using pooled regression or fixed effect or random effect estimation based on the tested result of LM and Hausman tests.

$$WPR_{it} = \alpha_i + \beta_1 TO_{it} + \beta_2 X_{it} + V_t + \varepsilon_{it} \tag{4}$$

Where, i is the country index (number of countries), t is the year index (from 2000 to 2016). The dependent variable WRPit is the percentage of working poor and TOit is the TO indicators in country *i* and in year *t*. The set of control variables (see section 3.2.3) are represented by Xit. α_i and v_t capture the country and time fixed effects respectively, and ε_{it} is the remainder error term capturing measurement errors and others.

Regression equation (4) will be estimated for four times as follows: first one for whole sample, second, third and fourth one is for subsamples of low income, lower-middle income and upper-middle income developing countries, respectively.

3.3.2 Dynamic panel data (DPD) model specification. Theoretically existence of working poverty trap has been found in the literature as discussed in section 2.6. So, without adding lag value of dependent variable as one additional independent variable, this analysis would suffer from the loss of dynamic information even in a panel data framework. To attain objective 2 as well as for identifying dynamic effects of TO, the study proposes following dynamic regression equation (5). Just like regression equation (5), the following equation will also be estimated four times.

$$WPR_{it} = \alpha_i + \theta WPR_{i,t-1} + \beta_1 TO_{it} + \beta_2 X_{it} + V_t + \varepsilon_{it} \tag{5}$$

The ordinary least square (OLS) methods are not applicable here, since lagged dependent variable may be correlated with the disturbance process causing the problem of endogeneity. Two approaches, namely, instrumental variable (IV) (Anderson and Hsiao, 1982), as the first step and GMM estimators (Arellano and Bond, 1991), as the second step, are often applied to estimate dynamic panel data (DPD) models. The problem with IV method is that it may not utilize all available sampling information and might fail to ensure the efficiency of estimators (Batlagi, 2005), which could be ensured by GMM methods. The Arellano Bond (AB) approach with GMM method is applicable if N (panel unit) is greater than T (time) and the left-hand variable depends on its own past values which is not strictly exogenous.

Since, the current study has a panel data for N (98 countries) > T (17 years) and lagged value dependent variable appears as one of the regressors which might not be strictly exogenous, applying GMM methods according to AB might be appropriate here. Also, using first step estimator is preferable because of its effectiveness in resulting more efficient estimators and a downward bias could arise in second step GMM estimator (Blundell and Bond, 1998). In DPD analysis having first order autocorrelation is not unusual since variables and errors are taken as first differences but they should not exhibit any second order autocorrelation autocorrelation. Also, ensuring the validity of over-identification restrictions

and the exogeneity of instruments by Sargan/Hansen test and Hansen test of excluding group/differences respectively could make correct estimation through first step GMM.

4. Empirical findings and analysis

4.1 Descriptive analysis
Simple descriptive statistics are represented in Table 3. The minimum value of working poverty rate is zero which prevailed in Belarus during 1991, in Iran during 2012 and 2013, in Moldova during 2015 and 2016, in Serbia during 2010 and in Ukraine during 2014. Throughout the sample period, Congo (Dem Rep.) experienced high WPR with the highest rate (96.1%) during 2001. Also, in 2002, Lao had high WPR (92.9%). The openness variables (TS and CTS) also varied.

The country rankings based on these two measurements of openness are shown in appendix-Table A1. Like Squalli and Wilson (2011) some major trading countries are ranked lower than expected ranking in terms of TS. Some of the largest developing countries such as China, Mexico and India ranked 80, 64 and 89 respectively according to TS which becomes 1, 3 and 4 when CTS is adopted. The ranking for Malaysia remains close to 1 using TS and 2 using CTS. Therefore, current study chooses CTS as TO variable.

4.2 Correlation analysis
The simple correlation represented in Table 4, shows that the WPR is negatively related with both measurement of openness, namely, TO (CTS) and TS with greater magnitude of the former than the latter. Similar negative also correlation also found with unemployment, school enrollment and labor productivity. But growth rate, age dependency and inflation are found to be positively associated with WPR.

4.3 Analysis of econometric regression results
4.3.1 Static analysis. As a preliminary analysis, the regression equation (4) has been estimated through pooled OLS, fixed effect and random effect model (see in Table A3 in appendix). And in order to decide about appropriate model, some diagnostic tests have been performed which are also represented in the bottom part of same table. The Breusch and Pagan Lagrangian multiplier test found that the p value is 0.00, which strongly rejects the null hypothesis with no significant difference across countries (no panel effects) that is pooled OLS is not appropriate here. The p value obtained from Hausman test is less than 0.05 (at 5% level of significance) which rejects the null hypothesis of no systematic differences in coefficients. Therefore, the fixed effect model is preferable than random effect analysis. The estimated

Variable	Observation	Mean	Std. Dev.	Min	Max
Working Poverty Rate (WPR)	1,666	22.83	24.63	0	96.1
Trade Openness (CTS)	1,666	65.83	196.70	0.0001	1930.39
Trade Share (Trade % of GDP)	1,666	79.07	38.15	0.17	351.11
Growth Rate	1,666	4.67	5.22	−36.70	63.38
Age Dependency Ratio	1,666	69.74	18.10	34.52	111.78
School Enrollment	1,666	103.28	16.40	21.72	150.79
Unemployment Rate	1,666	7.98	5.75	0.16	29.77
Inflation	1,666	26.85	602.07	−35.84	24411.03
Labor Productivity	1,666	9285.86	9502.17	506	61016

Table 3.
Descriptive statistics

Note(s): There were some missing values in school enrollment and inflation data which have been filled up by the mean value over the period of 2000–2016 for each nation

Variable	Correlation coefficient with WPR
Working Poverty Rate (WPR)	1.00
Trade Share (Trade % of GDP)	−0.19
Trade Openness (CTS)	−0.17
Growth Rate	0.05
Age Dependency Ratio	0.74
School Enrollment	−0.11
Unemployment Rate	−0.24
Inflation	0.05
Labor Productivity	−0.56
Source(s): Author's own calculation from collected data	

Table 4.
Correlation analysis

results through fixed effect model are tested to identify whether they are suffering from heteroskedasticity and autocorrelation problems or not. Since this study is dealing with panel data, the modified Wald Test has been conducted to identify the group-wise heteroskedasticity. The very low p value $> \chi^2 = 0.00$ strongly rejects the homoskedasticity assumptions. As well as since it is a long time series panel study, Wooldridge test for autocorrelation is conducted which rules out the null hypothesis of no serial correlation and conclude that the estimated model is suffering from autocorrelation problem. Finally, the test for time fixed effect revealed that there are significant time effects. Hence, the time dummies are also included with the model. Therefore, the estimated fixed effect model is suffering from both heteroskedasticity and autocorrelation problem. To mitigate the both problems, this study estimates the regression equation (4) through fixed effect models by clustering on panel id, i.e. country) and include time dummies since there are significant time fixed effects. The results are shown in the Table 5 in column (2).

The estimated results reveal that controlling for other variables, greater openness to trade significantly reduces the working poverty in developing countries as contrast to the findings of Hellier and Kalugina (2015) who found positive effects in OECD countries and Coulibaly and Yogo (2016) who found TO increases working poverty in 63 developing countries by using TS as a measurement of TO. While using CTS as a measure of TO, this study reveals

Dependent variable: Working poverty rate (WPR)	
(1) Variable name	(2) Fixed effect
Trade Openness (CTS)	−0.014 (0.00) ***
Growth Rate	−0.116 (0.04) ***
School Enrollment	−0.041 (0.43)
Labor Productivity	0.0000 (0.95)
Age Dependency	0.247 (0.21)
Unemployment Rate	−0.21 (0.34)
Inflation	0.0001 (0.00) ***
Constant	8.127 (0.58)
Number of Observations	1,666
Number of Groups	98
F-value	18.11
Prob $> F$	0.00
Overall R^2	0.41
Note(s): p values are shown in the parenthesis. ***, ** and * indicates significant at 1%, 5% and 10% level of significance respectively. Time dummies are included in regression equation	

Table 5.
Results of fixed effect
models clustering on
country

that TO reduces working poverty in developing countries. These findings are consistent with the theoretical predictions that TO increases skill premium in the North (rises inequality) but decreases skill premium in the South leading a reduction of inequality (Hellier, 2012). Hence, openness to trade is increasing the income of lower/low skilled workers which in turn reduces the working poverty in developing countries. The growth rate is also found to be significantly reducing the WPR. But the effects of some other control variables such as school enrollment, labor productivity, age dependency and unemployment are found to be insignificant. Although inflation is significantly increasing the working poverty, the magnitude of effects is very close to zero.

4.3.2 Comparison among different income group with static analysis. The overall scenario could be different for different country group according to income within the developing nations. Since the number of observations for high income country are very few to estimate panel fixed effect and make comparisons, the comparative analysis will be done only among the first three income group. The estimated fixed effect (clustering across countries) results for each of the three-income group are shown in column (2), (3) and (4) of Table 6 respectively.

The estimated results show interesting findings about the effect of TO on WPR in different income groups. In low-income countries, the effect seems to be insignificant, whereas in lower and upper-middle income countries, TO is found to be significantly reducing the WPR and the magnitude of effect is higher for the former than the later. The unemployment rate is not affecting the WPR in any group of countries. Both results indicate that TO is reducing working poverty without creating more unemployment. Similar results have been found for school enrollment.

In low-income countries, only the increased labor productivity could reduce the WPR as observed in column (2). Although inflation is found to negatively effect the working poverty, the magnitude of effects is very low. Moreover, the effects of inflation are insignificant for other two country groups. Age dependency is increasing the WPR only in lower-middle income country, but this result is significant at 10% level of significance. The growth rate is found to be highly significantly reducing the WPR only in upper-middle income countries.

4.3.3 Dynamic analysis. The estimated results of DPD model (equation 5) obtained by Arellano–Bond (AB) first steps GMM methods are shown in Table 7. The estimated model needs to satisfy the diagnostic test of autocorrelation and over identifying restriction. As shown in Table 7, for AR (1), the p value (prob > Z) = 0.001 which is less than 0.05. So, the null hypothesis of existence of first order autocorrelation could not be rejected. Due to first

(1) Variable name	(2) Low income	(3) Lower middle income	(4) Upper middle income
Trade Openness (CTS)	−0.66 (0.10)	−0.034 (0.00) ***	−0.009 (0.03) **
Growth Rate	0.006 (0.92)	−0.4 (0.30)	−0.08 (0.00) ***
School Enrollment	0.04 (0.46)	0.06 (0.52)	0.02 (0.68)
Labor Productivity	−0.02 (0.00) ***	−0.01 (0.23)	−00009 (0.24)
Age Dependency	−0.087 (0.85)	0.70 (0.01) **	−0.17 (0.22)
Unemployment Rate	0.497 (0.54)	0.23 (0.64)	0.09 (0.39)
Inflation	−0.0003 (0.00) ***	−0.07 (0.01) **	0.004 (0.82)
Constant	78.23 (0.002) **	−29.97 (0.16)	11.55 (0.31)
Number of Observations	408	663	544
Number of Groups	24	39	32
F-value	6455.42	86.15	5.71
Prob > *F*	0.000	0.00	0.00
Overall R^2	0.32	0.28	0.0007

Note(s): p values are shown in the parenthesis. ***, ** and * indicates significant at 1%, 5% and 10% level of significance respectively. Time dummies are included for each of the estimated model

Table 6.
Results of fixed effect models clustering on country for each income group

Variable name	GMM
Lag Working Poverty	0.54 (0.00) ***
Trade Openness (CTS)	−0.006 (0.00) ***
Growth Rate	−0.18 (0.00) ***
School Enrollment	−0.33 (0.00) ***
Labor Productivity	0.0007 (0.01) *
Age Dependency	−0.07 (0.83)
Unemployment Rate	−0.39 (0.29)
Inflation	0.0002 (0.72)
Number of Observations	1,470
Number of Groups	98
Number of Instruments	90
Diagnostic Test Results	
F-value	17.16
Prob > F	0.000
Arellano–Bond test for AR (1)	Z = −2.53 and Prob > Z = 0.011
Arellano–Bond test for AR (2)	Z = −1.11 and Prob > Z = 0.265
Hansen test of over identifying restrictions	χ^2 (65) = 80.52, Prob > χ^2 = 0.09

Note(s): p values are shown in the parenthesis. *** indicates significant at 1% level of significance, ** indicates significant at 5% level of significance and finally * indicates significance at 10% level of significance, time dummies are included in the model

Table 7.
Results of first step
GMM model

differences, it is common to have first order autocorrelation but there should not be any second order autocorrelation. For AR (2), the p value (prob > Z) = 0.265 > 0.05, so the null hypothesis of existence of second order autocorrelation could be rejected. Also, it is necessary to identify whether the model is suffering from over-identifying restrictions of instruments which could be done by Sargan or Hansen test. However, when there are many instruments, Sargan are not powerful tests (Roodman, 2009). So, it is better to observe the Hansen test. Roodman (2009) also suggest that number of instruments should be lower than number of groups. The Hansen p value (Prob > χ^2) = 0.09 > 0.05 as shown in Table 7, fails to reject the null hypothesis of over identified restrictions are valid. Therefore, future studies in this area should incorporate more samples and take others necessary steps to overcome this over-identification problem. This model satisfies the rules of using lower instruments (90) than the number of groups.

The estimated coefficient of lag working poverty is 0.54, which is significant at 1% level of significance. This result strongly proves that there is a self-reinforcing effect of WPR on itself and working poverty trap is a real phenomenon just like poverty trap. Once a person become working poor, it is difficult to break the trap without exogenous shocks.

The TO is found to be significantly reducing WPR just like static analysis, but the magnitude of effects is lower in dynamic analysis than in static analysis. The growth rate and school enrollment are also found to have expected significant effects. The effects of unemployment, inflation, age dependency and labor productivity are found to be insignificant.

4.3.4 Comparison among income groups with dynamic analysis. Like static analysis, the dynamic regression equation (5) is also estimated for three major income groups of countries. The results are represented in Table 8. Looking at the validity of these models through some diagnostic tests as represented in Table 3, it is observed that there are no second order autocorrelation. But the p value of Hansen test is 1, which weakens the assumptions of validity of over identifying restrictions. As well as number of instruments are higher than number of groups. These last two test results emerged due to smaller sample size which occurred due to dividing the whole sample.

(1)	(2)	(3)	(4)
		Lower-middle	Upper-middle
Variable name	Low income	income	income
Lag Working Poverty	0.69 (0.00) ***	0.57 (0.00) ***	0.76 (0.00) ***
Trade Openness (CTS)	0.04 (0.81)	−0.03 (0.147)	−0.003 (0.02) ***
Growth Rate	−0.27 (0.00) ***	−0.21 (0.02) ***	−0.12 (0.00) ***
School Enrollment	−0.01 (0.63)	−0.09 (0.57)	−0.06 (0.067) *
Labor Productivity	−0.008 (0.02) **	−4.17 (0.99)	−0.0002 (0.02) **
Age Dependency	−0.02 (0.95)	1.04 (0.13)	−0.38 (0.02) **
Unemployment Rate	0.12 (0.84)	2.00 (0.196)	0.32 (0.02) **
Inflation	0.0002 (0.34)	0.07 (0.57)	−0.005 (0.72)
Number of Observations	360	585	480
Number of Groups	24	39	32
Number of instruments	90	90	90
Diagnostic Tests Results			
F-value	534.06	13.77	101.51
Prob > F	0.000	0.000	0.000
Arellano–Bond test for AR (1), Prob > Z	0.036	0.11	0.010
Arellano–Bond test for AR (2), Prob > Z	0.978	0.61	0.84
Hansen test of over-identifying restrictions Prob > χ^2	1.00	1.00	1.00

Table 8.
Results of first-step
GMM model for each
income group

Note(s): p values are shown in the parenthesis. *** indicates significant at 1% level of significance, ** indicates significant at 5% level of significance and finally * indicates significance at 10% level of significance. Time dummies are included in all models

The self-reinforcing effect of WPR on itself significantly prevails in all income groups while the effect is higher among upper-middle income countries than the other two groups. But the effects of TO on WPR are found to be significant only in case of upper-middle income countries; while growth is found to reduce WPR in all groups with greater effects in lower middle-income countries. School enrollment is found to reduce the WPR only in upper-middle income countries at 10% level of significance, but labor productivity is found to be significantly reducing WPR in low and lower-middle income countries. In overall analysis age dependency and unemployment remain insignificant. But the analysis according to country group reveal that TO reduces as age dependency increases and TO decreases as unemployment increases only in upper-middle income countries. And inflation rate does not have any significant effects in any income group.

5. Conclusion
One of the sustainable development goals is to eradicate poverty by 2030 in all forms. A way of doing this is to ensure decent work. The WPR could be influenced by several micro and macro factors including globalization. Previous studies in this area have overwhelmingly focused on advanced countries. Current study assessed the effect of TO on working poverty and existence of working poverty trap in developing countries. This study also divided the analyses for low income, lower-middle income and upper-middle income countries.

The study found that TO significantly reduces the WPR in developing countries in general. The findings remain same both in static analysis and in dynamic analysis. These findings are consistent with H-O theoretical predictions that trade liberalization benefits the unskilled labor in developing nations. Also, the analysis using subsamples of different country groups found that this beneficial impact of TO is mainly driven up by lower- and upper-middle income developing countries. Moreover, as expected, the dynamic analysis

identified the existence of self-reinforcing effects of working poverty in developing nations. This highly statistically significant self-reinforcing effect is found in all three sub-sample of low, lower-middle and upper-middle income countries. But the problem is higher among low-income countries.

Therefore, TO is a beneficial factor to reduce the WPR in developing countries, specifically in the lower- and upper-middle income developing countries. But low-income countries which are suffering from working poverty trap most are unable to accrue the beneficial impacts of TO on working poverty. Low-income countries should learn from other developing countries how to reduce the WPR and how to accrue the beneficial effects of TO in reducing working poverty. Hence, besides improving the methodology, further research should focus on identifying the channels through which TO can reduce the WPR in developing countries particularly in low-income countries.

References

Anderson, T.W. and Hsiao, C. (1982), "Formulation and estimation of dynamic models using panel data", *Journal of Econometrics*, Elsevier, Vol. 18 No. 1, pp. 47-82.

Arellano, M. and Bond, S. (1991), "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", *Review of Economic Studies*, Vol. 58, pp. 277-297.

Balassa, B. (1978), "Exports and economic growth: further evidence", *Journal of Development Economics*, Vol. 5, pp. 181-189.

Balassa, B. (1985), "Exports policy choices, and economic growth in developing countries after the 1973 oil shock", *Journal of Development Economics*, Vol. 18, pp. 23-35.

Batlagi, B.H. (2005), *Econometric Analysis of Panel Data*, 3rd ed., John Wiley & Sons, Chichester.

Blau, F. and Kahn, L.M. (2002), *At Home and Abroad: U.S. Labour Market Performance in International Perspective*, Russell Sage Foundation, New York.

Blundell, R.W. and Bond, S.R. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, Vol. 87, pp. 115-143.

Cantillon, B. (2011), "The paradox of the social investment state: growth, employment and poverty in the Lisbon era", *Journal of European Social Policy*, Vol. 21 No. 5, pp. 432-449.

Coulibaly, A. and Yogo, U.T. (2016), "Access to financial services and working poverty in developing countries", Étudeset Documents, CERDI, available at: http://cerdi.org/production/show/id/1833/type_production_id/1.

Crettaz, E. (2011), *Fighting Working Poverty in Post-industrial Economies: Causes, Trade-Offs and Policy Solutions*, Edward Elgar Publishing, Cheltenham and Northampton, MA.

Crettaz, E. (2013), "A state-of-the-art review of working poverty in advanced economies: theoretical models, measurement issues and risk groups", *Switzerland Journal of European Social Policy*, Vol. 23 No. 4, pp. 347-362.

Crettaz, E. and Bonoli, G. (2011), "Worlds of working poverty, national variations in mechanisms", in Fraser, N., Gutiérrez, R. and Peña-Casas, R. (Eds), *Working Poverty in Europe. A Comparative Approach*, Palgrave Macmillan, Basingstoke, pp. 46-69.

Deardorff, A.V. (1986), "Fireless fireworks: how preferences can interfere with the theorems of international trade", *Journal of International Economics*, Elsevier, Vol. 20 Nos 1-2, pp. 131-142.

Dollar, D. and Kraay, A. (2001), *Trade, Growth and Poverty*, Mimeo, Development Research Group, The World Bank, Washington.

Dollar, D. and Kraay, A. (2004), "Trade, growth and poverty", *The Economic Journal*, Vol. 114, pp. 22-49.

Eurostat Database (2014), available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Falvey, R., Tyres, R. and McDougall, R. (1997), *Trade Shocks and the Magnitude of Transmitted Wage Adjustments*, Papers 318, Australian National University, Department of Economics.

Friedman, J. (2001), "Differential impacts of trade liberalization on Indonesia's poor and non-poor", *Paper Prepared for the Conference "Poverty and the International Economy", Stockholm, 20-21, 2000, Organized by the World Bank and the Swedish Parliamentary Commission on Global Development*.

Harrington, M. (1962), *The Other Americans: Poverty in the United States*, Published by Simon & Schuster.

Heckscher, E.F. and Ohlin, B. (1991), *Heckscher-Ohlin Trade Theory*, translated edited, and introduced by Harry Falm and M. June Flanders, MIT Press, Cambrodge, MA.

Hellier, J. (2012), "The North-south HOS model, inequality and globalization. ECINEQ (society for the study of economic inequality)", Working Paper Series. available at: www.ecineq.org

Hellier and Kalugina (2015), "Globalization and the working poor", ECINEQ (Society for the Study of Economic Inequality), Working Paper Series, 2015-355.

Herman, E. (2013), *Impact of Entrepreneurship on Employment and Poverty Reduction*, ASE Publishing House, Bucharest.

ILO (2016), *World Employment and Social Outlook 2016: Transforming Jobs to End Poverty*, International Labour Organization, Geneva, available at: www.ilo.org/publns

Kalugina, E. (2012), "The working poor", in Hellier, J. and Chusseau, N. (Eds), *Growing Income Inequalities*, Chapter 3, Palgrave Macmillan, pp. 76-104.

Kapsos, S. (2005), "Estimating growth requirements for reducing working poverty: can the world halve working poverty by 2015?", Employment Strategy Papers, ILO 2004/14, available at: http://cndwebzine.hcp.ma/cnd_sii/IMG/pdf/esp14.pdf

Kapsos, S. and Bourmpoula, E. (2013), *Employment and Economic Class in the Developing World*, ILO Research Paper No. 6, (Geneva, ILO).

Krueger, A. and Berg, A. (2003), *Trade, Growth, and Poverty: A Selective Survey*, IMF Working Paper, WP/03/30, International Monetary Fund, Washington.

Le Goff, M. and Singh, R.J. (2014), "Does trade reduce poverty? A view of africa", *Journal of African Trade*, Vol. 1, pp. 5-14, doi: 10.1016/j.joat.2014.06.001.

Liu, J. (2022), "Rethinking the defining contextualization of in-work poverty: the challenge of individualism and globalization", *The Journal of Chinese Sociology*, Vol. 9 No. 1, doi: 10.1186/s40711-021-00160-z.

Markusen, J.R. (1995), "The boundaries of multinational enterprises and the theory of international trade", *The Journal of Economic Perspectives*, Vol. 9 No. 2, pp. 169-189.

Palacios, R.G., Rodríguez, A.M.G. and Peña-Casas, R. (2009), *Earnings Inequality and In-Work-Poverty. REC-WP 07/2009 Working Papers on the Reconciliation of Work and Welfare in Europe RECWOWE Publication*, Dissemination and Dialogue Centre, Edinburgh.

Peña-Casas, R. and Latta, M. (2004), *Working Poor in the European Union*, European Foundation for the Improvement of Living and Working Conditions, Dublin.

Ravallion, M. and Chen, S. (1997), "What can new survey data tell us about recent changes in distribution and poverty?", *World Bank Economic Review*, Vol. 11 No. 2, pp. 357-382.

Ricardo, D. (1817 and 1951), *Principles of Political Economy and Taxation*, Penguin, New York.

Robinson, S. and Thierfelder, K. (1996), *The Trade-Wage Debate in a Model with Nontraded Goods: Making Room for Labour Economists in Labour Theory*, TMD Discussion Papers 9, International Food Policy Research Institute (IFPRI).

Roodman, D. (2009), "How to do xtabond2: an introduction to difference and system GMM in stata", *Stata Journal*, Vol. 9 No. 1, pp. 86-136, Stata Corp LP.

Sen, K. (2008), "Trade policy and wage inequality: evidence from Indian manufacturing", *Indian Growth and Development Review*, Vol. 1 No. 2, pp. 147-171.

Smith, A. (1776 and 1965), *An Enquiry into the Nature and Causes of the Wealth of Nations*, Cannan Edition, (1950), Methun, London.

Snower, D.J. (1994), "The low-skill, bad-job trap", IMF Working Paper No. 94/83, available at: https://ssrn.com/abstract=883810

Squalli, Jay and Wilson, K. (2011), "A new measure of trade openness", *The World Economy*, Vol. 34 No. 10, pp. 1745-1770.

Strengmann-Kuhn, W. (2003), *Armut Trotz Erwerbstätigkeit: Analysen and Sozialpolitische Konsequenzen*, Campus Verlag, Frankfurt/Main.

Tyers, R. and Yang, Y. (1997), "Trade with asia and skill upgrading: effects on labour markets in the older industrial countries", Weltwirtshaftliches Archive, Band 133, Heft 3, September, pp. 383-418, doi: 10.1007/BF02707496.

Vandenbroucke, F. and Vleminckx, K. (2011), "Disappointing poverty trends: is the social investment state to blame?", *Journal of European Social Policy*, Vol. 21 No. 5, pp. 450-471.

Wood, A. (1997), "Openness and wage inequality in developing countries: the Latin American challenge to east asian conventional wisdom", *World Bank Economic Review*, Vol. 11 No. 1, pp. 33-57.

Further reading

Ethier, W.J. (1984), "Higher dimensional issues in trade theory", in Jones, R.W. and Kenen, P.B. (Eds), *Handbook of International Economics*, Elsevier Science Publishers B.V, Vol. 1, pp. 131-184.

Gautie and Ponthieux (2016), "Employment and the working poor", in Brady, D. and Linda, M. (Eds), *The Oxford Handbook of the Social Science of Poverty*, Burton, doi: 10.1093/oxford/9780199914050.013.22.

ILO (2017), *World Employment and Social Outlook: Trends 2017*, International Labour Organization, Geneva, available at: www.ilo.org/publns

ILO Manual Second Version (2013), *Decent Work Indicators: Guidelines for Producers and Users of Statistical and Legal Framework Indicators*, International Labour Organization, Geneva, ISBN 9789221280187; 9789221280194.

Krasnozhon, L.A., Simpson, D. and Block, W.E. (2015), "Fair trade: its real impact on the working poor", *The Review of Social and Economic Issues*, Vol. 1 No. 2, p. 5.

Tyler, W.G. (1981), "Growth and export expansion in developing countries: some empirical evidence", *Journal of Development Economics*, Vol. 9 No. 1, pp. 121-130.

Corresponding author
Hazera-Tun- Nessa can be contacted at: hazeratunnessa@du.ac.bd

Appendix

Country	Trade share (TS)	Country ranking by TS	Trade openness (CTS)	Country ranking by CTS
Afghanistan	75.331	47	10.66053	54
Albania	71.79708	49	7.066797	68
Algeria	65.70506	58	81.46497	18
Angola	113.315	18	90.43529	16
Argentina	33.62011	94	53.17955	23
Armenia	70.50508	51	4.745548	76
Azerbaijan	88.24711	34	30.4453	28
Belarus	129.2917	8	95.47773	15
Belize	121.5898	13	3.020058	83
Benin	57.64536	69	2.908418	84
Bhutan	96.31927	27	1.570695	90
Bolivia	67.84341	56	11.1461	52
Botswana	96.91396	26	15.02533	46
Brazil	25.62347	97	128.5298	12
Burkina Faso	45.44628	86	2.224728	87
Burundi	38.6706	91	0.362302	95
Cambodia	124.7505	12	21.16107	40
Cameroon	52.14952	75	8.943594	59
Central African Republic	38.42088	92	0.354989	96
Chad	81.02133	43	6.986075	69
Chile	67.37432	57	108.2401	13
China	49.68778	80	1517.029	1
Colombia	36.09537	93	39.53235	25
Comoros	59.81222	66	0.230885	98
Congo, Rep.	138.7442	6	21.85159	38
Congo, Dem. Rep	61.28379	63	10.70872	53
Côte d'Ivoir	81.23293	42	21.66284	39
Dominican Republic	64.86909	60	29.26839	30
Ecuador	55.52849	71	25.13022	34
Egypt	48.09851	82	56.11307	22
El Salvador	69.81248	53	15.35027	45
Equatorial Guinea	170.9864	2	34.82838	27
Fiji	119.4559	15	7.121443	67
Gabon	84.77087	39	12.26549	49
Gambia	69.29574	54	0.584661	94
Georgia	86.82548	38	10.04488	56
Ghana	88.46438	33	22.94172	36
Guatemala	61.30778	62	20.89346	41
Guinea-Bissau	50.44996	78	0.281185	97
Guyana	153.2827	3	5.964892	71
Honduras	120.0798	14	28.88405	31
India	43.16922	89	323.5085	4
Indonesia	51.74197	76	193.5155	8
Iran	46.6403	85	99.73135	14
Iraq	94.58643	31	323.3577	5
Jamaica	86.97669	37	15.37911	44
Kenya	54.07477	72	13.28814	48
Kyrgyzstan	114.3615	17	7.633824	65

Table A1.
List of countries and
country ranking in
terms of trade
openness

(continued)

Country	Trade share (TS)	Country ranking by TS	Trade openness (CTS)	Country ranking by CTS
Lao PDR	79.74292	44	5.360803	72
Lebanon	82.70414	40	30.28115	29
Liberia	152.0785	4	3.580807	81
Madagascar	69.8348	52	5.297497	74
Malawi	60.20103	65	2.398717	86
Malaysia	174.6927	1	944.1561	2
Mali	58.55401	68	4.178428	77
Mauritania	100.44	22	4.774821	75
Mauritius	114.4591	16	17.25321	43
Mexico	60.8348	64	525.2709	3
Moldova	127.3106	9	10.00559	57
Mongolia	111.7827	19	8.671904	62
Morocco	73.82289	48	59.77597	21
Mozambique	87.3556	35	10.45493	55
Myanmar	14.41973	98	2.730625	85
Namibia	100.0193	23	12.13427	50
Nepal	47.55882	83	4.10569	78
Nicaragua	87.15684	36	8.875063	60
Niger	53.23429	73	1.923737	89
Nigeria	52.40287	74	74.97773	19
Pakistan	31.73046	96	22.65388	37
Panama	131.0305	7	63.79642	20
Paraguay	95.13461	30	20.08101	42
Peru	46.67364	84	35.90855	26
Philippines	81.48235	41	169.1718	9
Rwanda	40.20056	90	1.030508	92
Senegal	70.68229	50	7.730807	64
Serbia	77.94997	46	28.75011	32
Sierra Leone	57.14503	70	1.237963	91
Solomon Islands	95.49316	28	0.85596	93
South Africa	58.90499	67	136.5249	11
Sri Lanka	63.47668	61	23.94387	35
Sudan	32.45673	95	6.849308	70
Suriname	89.9672	32	3.401743	82
Swaziland	125.5811	11	8.679517	61
Tajikistan	97.05035	25	5.299053	73
Tanzania	45.09752	87	7.238093	66
Timor-Leste	126.6809	10	2.200227	88
Togo	97.57484	24	3.840877	80
Trinidad and Tobago	102.007	21	28.63543	33
Tunisia	95.46703	29	50.63815	24
Turkey	48.11678	81	197.5616	7
Uganda	44.2885	88	4.04853	79
Ukraine	103.3158	20	156.5884	10
Uruguay	51.21288	77	11.35	51
Venezuela	50.26997	79	88.93492	17
Viet Nam	145.873	5	293.6141	6
Yemen	65.10822	59	15.00498	47
Zambia	68.5775	55	9.129158	58
Zimbabwe	78.9137	45	8.26565	63

Table A1.

Variable name	Definition and measurement	Sources of data
Working Poverty Rate (WPR)	Working poverty rate (percentage of employed living below US$1.90 PPP)	International Labour Organization. Web Address: http://www.ilo.org/ilostat
Unemployment Rate	Unemployment, total (% of total labor force) (modeled ILO estimate)	
Labor Productivity	Output per worker measured in GDP constant 2011 international $ in PPP	
Trade Openness (CTS)	Composite Trade Share. Calculated by using data on export and import measured in current US dollar	World Development Indicators. Web Address: https://data.worldbank.org
Trade Share	Sum of exports and imports of goods and services measured (% GDP)	
Growth Rate	Annual percentage growth rate of GDP at market prices	
Age Dependency	The ratio of dependents (younger than 15 or older than 6) to the working-age population (those ages 15–64)	
Inflation	Inflation as measured by the consumer price index (CPI)	
School Enrollment	Primary enrollment (% gross). Gross enrollment ratio is the ratio of total enrollment, regardless of age	

Table A2.
Variable description and data sources

(1) Variable name	(2) Pooled OLS	(3) Fixed effect	(4) Random effect
Trade Openness (CTS)	0.005 (0.02) **	−0.012 (0.00) ***	−0.011 (0.00) ***
Growth Rate	0.069 (0.34)	−0.087 (0.00) ***	−0.089 (0.00) ***
School Enrollment	0.092 (0.00) ***	−0.107 (0.00) ***	−0.100 (0.00) ***
Labor Productivity	−0.0006 (0.00) ***	−0.0004 (0.00) ***	−0.0004 (0.00) ***
Age Dependency	0.827 (0.00) ***	0.725 (0.00) ***	0.736 (0.00) ***
Unemployment Rate	−0.398 (0.00) ***	0.079 (0.28)	0.008 (0.91)
Inflation	0.0015 (0.02) **	0.0002 (0.49)	−0.0002 (0.46)
Constant	−35.891 (0.00) ***	−12.386 (0.00) ***	−12.675 (0.00) ***
Number of Observations	1,666	1,666	1,666
Number of Groups	–	98	98
F-value	386.99	107.41	–
Prob > F	0.000	0.00	0.00
Wald χ^2	–	–	904.32
Prob > χ^2	–	–	0.00
Overall R^2	0.62	0.56	0.57

Diagnostic Tests

Breusch and Pagan Lagrangian Multiplier Test: prob > chibar2 = 0.000

Hausman Test: prob > χ^2 = 0.000

Modified Wald Test for group wise Heteroskedasticity: prob > χ^2 = 0.000

Wooldridge Test for autocorrelation in panel data: prob > F = 0.000

Testing for Time Fixed Effect: prob > F = 0.000

Note(s): p values are shown in the parenthesis. ***, ** and * indicates significant at 1%, 5% and 10% level of significance respectively

Table A3.
Preliminary estimates through pooled OLS, fixed effect and random effect models